NATIONAL SCIENCE FOUNDATION
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OFFICE OF THE
ASSISTANT DIRECTOR
FOR GEOSCIENCES

August 20, 1999

Professor George Hornberger
Department of Environmental Sciences
Clark Hall
University of Virginia
Charlottesville, VA 22903

Dear Professor Hornberger:

Understanding the role the hydrologic cycle plays in key planetary processes is essential to our nation and societies around the world. It is becoming increasingly clear that one of the most significant challenges of the coming century will be to ensure the availability of an adequate supply of water for the world, particularly in light of potential changes in that supply due to climate variability, climate change and other natural and anthropogenic influences. Deficiencies in our understanding of the global water cycle severely handicap efforts to improve climate prediction and guide water resource planning. In the development of the FY 2000 US/GCRP program and budget, it was proposed that a "Global Water Cycle" program should be an initiative in the President's Budget as an integral part of the Global Change Research Program for FY 2000 and beyond (this is now being considered by the Congress in the President's FY 2000 Budget). Central to this initiative is the establishment of a science community-based research planning process complemented by an enhanced interagency coordination effort to address the content of this effort for FY 2001 and beyond. The foundations for this effort have been well established by research supported by the US/GCRP, other agency programs, and related international programs (WCRP/GEWEX, IGBP, etc.). Significant advances have already been made in seasonal to interannual prediction, land surface modeling capabilities, land data assimilation systems, and other facets of hydrologic processes. The planned launches of a number of satellites by the USA, Japan, and Europe during the next few years will make further contributions to this issue, e.g., precipitation, monitoring land surface conditions, and the transport of water in the atmosphere and at the surface.

Accordingly, the US/GCRP agencies are establishing a broad-based planning process that will lead to a comprehensive and long-term strategy and science plan for investigating the global water cycle, its role in climate, and an enhanced scientific understanding of the fundamental processes that govern the availability and the biogeochemistry of water resources. It is our belief

that these comprehensive research efforts will provide the scientific framework needed to address this critical scientific, policy and operational issue.

This letter, as we discussed recently, is to ask you to form and chair a "Water Cycle Study Group," consisting of researchers from the hydrologic, atmospheric, and oceanic sciences. The US/GCRP will work with you to identify potential members. In this regard, we will ask the US/GCRP and other interested agencies, the National Research Council, and other appropriate groups to identify those individuals who could work with you in conducting the work of this Study Group. Once we have developed a list of candidates, we can jointly discuss the final membership of the Study Group.

The Water Cycle Study Group will be charged with the responsibility of formulating a research strategy and scientific plan for investigating the global water cycle, its role in climate, and the fundamental processes that govern the availability and the biogeochemistry of water resources. In short, we are asking the Study Group to develop the strategy and science plan for a national program. This "Science Plan" should be designed to produce:

1. A quantitative understanding of atmospheric, terrestrial, and oceanic interactions that govern water and energy cycles on intraseasonal to centennial time scales and on global and regional scales: this includes, *inter alia*, the roles of water vapor, clouds, and precipitation processes; biogeochemical processes, terrestrial and aquatic ecosystem influences; and the role of surface and subsurface waters within the overall hydrologic cycle;
2. An improved representation of these processes in climate and other models, across the relevant space and time scales, that will allow simulation of the hydrologic cycle and its interactions with the rest of the earth system;
3. An understanding of the response of the water cycle to environmental change and the accompanying impact on water resources;
4. A capability to model and, where appropriate, predict variations in global and regional hydrologic processes and water resources on seasonal to interannual time scales and longer time scales;
5. The requirements for comprehensive, systematic space-based, ground-based and *in situ* observations in support of the water cycle science objectives, with consideration of the compatibility of measurements across scales and processes; and
6. Guidance on the linkages, areas of cooperation and potential integration with other relevant national and international programs to make this initiative a success.

Due to requirements in the federal budget planning cycle, we will need to have a preliminary draft/outline that can be shared with the agencies by the end of September 1999, and an interim

comprehensive document prepared by late January 2000. The final document should be ready by July 2000.

The agencies have established an Interagency Working Group on the Water Cycle that will interact closely with your team during the development of the Plan. Dr. Rick Lawford, of NOAA/OGP and Dr. Robert Schiffer, of NASA/ESE are the co-chairs of this Interagency Working Group and will assist you as necessary. The Working Group will be the vehicle for developing the Federal set of programs and activities. Our goal is to have the essential next phase of this "Water Cycle Program" well planned and integrated into the FY 2001 programs and budgets of the agencies of the US/GCRP. We will discuss with you the logistic and financial support requirements necessary to carry out this activity.

We sincerely hope that you can formally accept this invitation to chair the "Water Cycle Study Group." On behalf of the US/GCRP agencies, we thank you for your willingness to entertain undertaking this important and challenging task for the Nation. We look forward to hearing from you and to working with you as we jointly address this serious and vitally important challenge for the Nation.

Sincerely,

Robert W. Corell, Chair
Subcommittee on Global Change Research

cc: Dr. Neal Lane
Dr. D. James Baker
Dr. Rosina Bierbaum
SGCR Members
Members of the Interagency Working Group on the Water Cycle